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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,830	02/11/2004	Hardayal Singh Gill	HITIP060/HSJ920030255US1	6165

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EXAMINER

BERNATZ, KEVIN M

ART UNIT PAPER NUMBER

1773

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/777,830

Applicant(s)

GILL ET AL.

Examiner

Kevin M. Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Amendment

1. Amendments to claims 8, 12 and 19, filed on February 14, 2006, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Examiner's Comments

3. Applicants' declaration to antedate Hasegawa et al. ('021 A1) has been considered and is deemed persuasive. As such, Hasegawa et al. ('021 A1) no longer qualifies as prior art under 35 U.S.C. 102 and/or 103.

Claim Rejections - 35 USC § 103

4. Claims 1 – 7, 9, 11 – 18, 20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (U.S. Patent No. 6,462,919 B1) in view of Parkin (Phys. Rev. Lett., 67(25), 1991, 3598 – 3601) for the reasons of record as set forth in Paragraph No. 8 of the Office Action mailed on November 14, 2005.

Regarding the amended language of claim 12, the Examiner notes that Mack et al. explicitly teaches stopping the removal of the AP coupling layer prior to reaching the free magnetic layer, hence leaving a thin portion of the AP coupling layer remaining

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above the active portion of the free magnetic layer (*col. 4, line 61 bridging col. 5, line 11*).

5. Claims 8, 10, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. in view of Parkin as applied above, and further in view of Fuke et al. (U.S. Patent No. 6,455,178 B1) for the reasons of record as set forth in Paragraph No. 9 of the Office Action mailed on November 14, 2005

Regarding amended claims 8 and 19, Fuke et al. teach forming a free layer directly on a layer of NiFe (*Figure 10, elements 9 and 10 and Example 5*). The Examiner further notes that “formed on” is absent a frame of reference and is technically a process limitation in a product claim. Applicants are reminded that in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, depending on which direction the head element is formed determines which layer is deposited “first” (i.e. “formed ... on”). As such, the only structural limitation resulting from the language “formed directly on” is that the layers must be directly adjacent, since no other relative order of the layers is recited.

However, that being said, the Examiner also notes that Fuke et al. explicitly teach forming the NiFe layer closest to the Cu spacer layer, which would place the NiFe layer “under” the Co-based free magnetic layer in the MR element disclosed by Mack et al. (*Figure 6A, elements 208 and 210 of Mack et al.*).

Response to Arguments

6. The rejection of claims 1 - 23 under 35 U.S.C § 102(e) and/or 103(a) – Hasegawa et al., alone or in view of various references

The above noted rejection has been withdrawn because applicant(s) have provided sufficient evidence that they antedate the filing date of the Hasegawa et al. reference.

7. The rejection of claims 1 - 23 under 35 U.S.C § 103(a) – Mack et al. in view of various references

Applicant(s) argue(s) that there is a difference between “AP coupling” and “antiferromagnetic coupling” and, hence, Parkin is not combinable with the Mack et al. reference (*pages 9 – 11 of response*). The Examiner respectfully disagrees.

The Examiner notes that applicants own specification recognizes that the two terms are interchangeable to one of ordinary skill in the art (*see specification page 16, lines 7 – 15: which refers to the antiferromagnetic coupling force of the AP coupling layer*). Essentially, the two nomenclatures are referring to the same structure but to different effects. Two ferromagnetic (FM) layers separated by a non-magnetic material layer formed of Ru, Ir, Cu, Rh and other materials are coupled via magneto-static coupling (often referred to as exchange coupling due to the large magnitude of the coupling force). The magnetization directions of the two FM layers are either parallel to each other (referred to as “ferromagnetic coupling”) or anti-parallel to each other

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(referred to as “antiferromagnetic coupling”, or RKKY-type coupling). In embodiments where the two magnetization directions are anti-parallel to each other, this is also sometimes called a “synthetic antiferromagnetic structure” or a “synthetic/artificial ferromagnetic structure” (see *Hasegawa et al. '021 A1 – Paragraphs 0005 – 0016*). The structure and effects are the same, but the nomenclature used to refer to the structure is different.

See also applicants' specification (pages 4 – 5), which recognizes that the two FM layers are magnetostatically coupled across the Ru spacer layer of ~8 Å thickness and result in what applicants are terming “AP coupling”. Compare this to the teachings in Parkin, which refers to “antiferromagnetic coupling” of the FM layers across an 8 Å Ru spacer layer.

Finally, as further evidence that one of ordinary skill in the art would recognize that the two terms are interchangeable and refer to the same structure, the Examiner notes Daughton et al. (U.S. Patent App. No. 2004/0013880 A1) (*Paragraph 0011: which essentially summarizes what the Examiner wrote above*).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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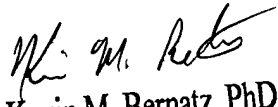
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
April 26, 2006


Kevin M. Bernatz, PhD
Primary Examiner